

PAVEMENTS *for* MODERN TRAFFIC



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PAVEMENTS *for* MODERN TRAFFIC



PORTLAND CEMENT ASSOCIATION

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FOREWORD



EVERYDAY American life throbs with opportunities in industry, commerce, education and in civic improvements. In a comparatively short period of time the average American citizen has developed a remarkable degree of civic consciousness toward the community in which he lives.

Travel wherever you will—to the little hamlets by the wayside or to the great metropolitan cities—you will always find the citizen who is proud of his community. To him it is "home" in every sense of the word. There is no other community—no matter how large or how small—that represents as much to him as the "old home town." His interests are there. Consequently, he is forever willing and anxious to help make it a model community for others to follow. Such is the sense of civic consciousness that has gripped the people quite generally everywhere. This feeling is better exemplified by the rapid growth of communities "alive" with progressive citizens and by the increased interest in civic improvement.

An American city does not grow as a result of the birthrate alone. It must interest citizens who will bring and develop new industries. It follows, therefore, that the American citizen is keenly interested in the impression his town makes upon the visitor.

The visitor's impression of any city is almost immediately affected by good street pavements—or by the need of them. Good pavements usually indicate what is commonly called "a good town." Poorly paved streets create an unfavorable impression, and form one reason why travelers avoid certain cities whenever possible.

Further, the universal desire for comfort, convenience, and healthful surroundings leads to investments in utilities which satisfy these wants. It is these utilities, in turn, which make large concentrations of population, and which we call cities, at all possible. Business, personal convenience, and normal diversion are now served first by motor vehicle transportation. Good pavements are therefore one of the first requirements of a progressive city.

A knowledge of pavements, and pavement values should be sought by every intelligent citizen. Such knowledge is a valuable asset to the property owner when his city buys pavement.

The statements in this booklet represent the composite opinion and experience of paving engineers and property owners in practically every section of America. We may profit from the experience of others, and so to the thinking American citizen and his city officials the information on the following pages is addressed.



Union Street, Morganton,
North Carolina. A typical
and attractive concrete
paved residential street.

THE TREND TOWARD BETTER AND SAFER STREETS



INCREASED congestion and a rapidly mounting accident rate has brought about a realization that streets must be designed for a new condition.

People now realize quite generally that congestion is costly. The motor vehicle loses a large part of its usefulness if it cannot be driven safely at reasonable speeds. City streets are being designed to speed up traffic.

Many communities have adopted definite street plans far in advance of development in order to assure adequate widths and continuity. When street planning is done in this manner it usually is less expensive than widening the same streets after growth has taken place. In event greater widths of streets are needed, the established plan usually makes this possible without exorbitant expense or damaging property.

When growth occurs first, widening of chief thoroughfares is somewhat like a major surgical operation—expensive, in-

convenient, perhaps painful; but absolutely necessary to continued civic existence. Happily, however, any widening project, if well planned and carried out, usually creates values far in excess of its costs. As not all streets can be widened, *better use must be made of existing widths.* This is being done by improving many details which often are unobtrusive and obscure, but nevertheless *important.*

At intersections, square corners are being rounded back to a wider radius which corresponds more nearly to the turning radius of the vehicle. This minor improvement alone eliminates congestion caused by vehicles veering to the center of the street in order to make the turn to the right. Another improvement which aids in giving existing street widths maximum carrying capacity is to be found in the modern curb design. Sloping faced curbs, instead of vertical, with rounded edges and corners, permit vehicles to stop close to the curb without the danger of injuring the sidewalls of the tires.



The excellent concrete pavement on Bellevue Avenue, Newport, R. I., carries traffic smoothly and silently past the luxurious summer homes of America's most wealthy citizens.



This concrete pavement was laid in 1912. Phillips Avenue in Sioux Falls, S. D.

IMPORTANCE OF SATISFACTORY PAVEMENTS



IN the wise purchase of your possessions you consider their possible future value as well as their present worth. When buying a pavement for your street, you want the best that the money you have to pay out will purchase. The best that can be selected is the one that combines attractive appearance with those qualities that keep it "good" for many years of service. You want to buy "satisfaction."

Whether you own or rent your home or place of business, it is *your* money which pays for the street pavement that passes your door. Directly or indirectly, the cost comes out of your own pocket.

Daily social and business life is becoming more and more dependent upon motorized transportation. The surface

of the streets and highways is all-important to the satisfactory movement of motor vehicles. The pavement no longer merely serves to keep traffic out of the mud and dust; it is just as much a part of transportation service as is the vehicle itself. The cost of the pavement, and its maintenance, is an important part of the cost of transportation. A street that has to be frequently repaired or repaved is not satisfactory. Such a pavement in front of your place of business is a serious deterrent. Traffic delays are not only annoying; they are also expensive. The value and resale possibilities of your residential property are affected adversely by bad pavement conditions.

It is money in your pocket to see that permanent satisfaction is built into the pavement you buy.

MODERN TRAFFIC DEMANDS MODERN PAVEMENTS



EARLY forty years ago, an Irish horse doctor named Dunlop inflated a rubber tube and tied it on the rim of his boy's velocipede. This led to the development of the pneumatic tire. Later, with the invention of a small, dependable gasoline engine, a new era in transportation began. This change in traffic has influenced the design of street and road pavements.

Early street surfaces were designed for the traffic of that day when probably the heaviest single load was a coal wagon, or, in the country town, the farmer's load of grain. It is not surprising that these older pavements are breaking down under the punishment of loads unthought of twenty years ago.

In pavements, as in industry, the materials of a former decade are not fit for the tasks today. Pavements designed for less than a quarter of the loads now imposed are carrying large numbers of automobiles and sixteen-ton trucks with trailers. No wonder they fail!

The pavement necessary now is one that, when laid, can be finished to a truly even surface and which will retain that trueness of surface regardless of temperature changes and the blows of traffic. If it has a tendency to form waves, ruts, or hollows, causing impact and vibration, it is undesirable for present day use.

The even or uneven surface of a pavement directly affects the economy of motor car operation. An increase in operating cost of one cent per mile, due to rough streets, is considered a conservative estimate. Perhaps two cents per mile is nearer the true figure. Impact and vibration also have a serious, destructive effect on the pavement.

Modern traffic demands a firm, rigid surface. To meet this demand, it was natural that engineers began to consider portland cement concrete as a paving material. Long used for the most permanent of buildings, dams, and bridges, it was soon found that concrete offered certain characteristics peculiarly adapted to fast, rubber-tired motor driven traffic.



All highway traffic entering or leaving Chicago on the East or Southeast uses Indianapolis Avenue, which is paved with a ten-inch thickness of concrete.

PAVEMENTS FOR MODERN TRAFFIC

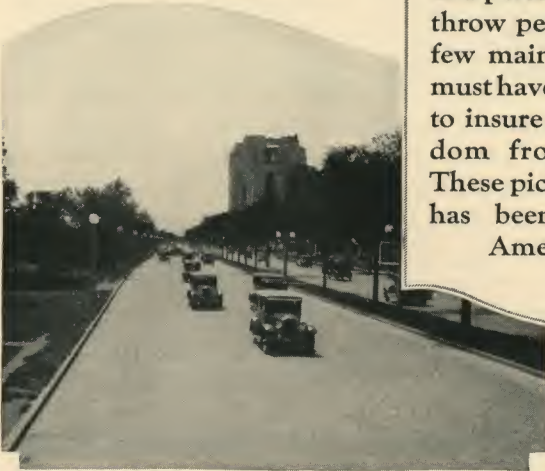


Colorado Street, Pasadena, Calif.

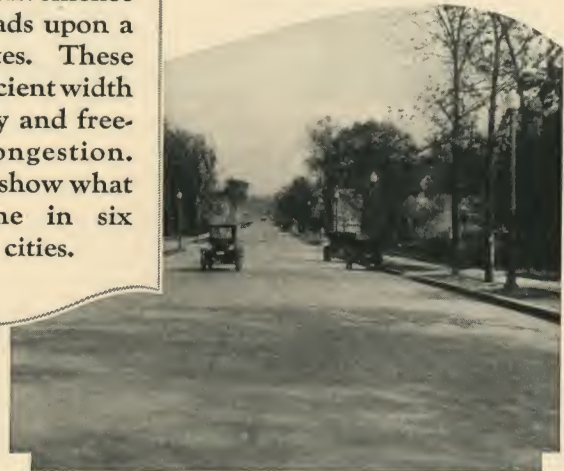


West Lake Boulevard, Seattle, Wash.

There are always certain streets where traffic concentrates. Travel habits and personal convenience throw peak loads upon a few main routes. These must have sufficient width to insure safety and freedom from congestion. These pictures show what has been done in six American cities.



Lake Shore Drive, Chicago, Ill.



Linden Avenue, Winnetka, Ill.



Main Street, West Frankfort, Ill.



North Main Street, Logan, Utah.

PAVEMENTS FOR MODERN TRAFFIC



McGee Street trafficway leads to the heart of Kansas City's business section.



Union Street, Seattle, Wash. Concrete surfaced in 1923. Retail business district.

HEAVY TRAFFIC STREETS



INCE the first roads were built, mankind has recognized the need of sturdy pavement construction on streets and highwayssubjectedtoheavytraffic. The materials for these pavements have varied through the ages. The Romans used flat stones. Later, others made use of cobble, granite block and thick layers of crushed stone. All of these materials, though wear resisting in character, produced rough pavements. The problem of a smooth, heavy duty pavement was not solved until the twentieth century, when portland cement concrete was developed as a paving material.

Concrete is the logical pavement for heavy traffic. It is virtually a solid artificial stone pavement which combines smoothness with bearing power. Being inherently rigid, concrete does not displace to form waves, ruts or holes in the surface of the slab which produce impact from the heavy wheel loads passing over them. Such shocks will soon destroy pavement surfaces which are not strong enough to resist displacement. The effect of heavy wheel loads on a concrete pavement is uniformly distributed over a

greater area than is possible in pavements designed for the horse-drawn traffic of yesteryear. Pressure on the subgrade under a concrete pavement is less per square foot than beneath a non-rigid or flexible type. Consequently, the supporting power of the soil, whatever it may be, is fully utilized. This is especially important where the soil is soft.

Engineers can now predetermine the strength of a concrete pavement. By anticipating the type and the volume of traffic which will use the street, the pavement can be accurately designed to support the maximum loads without damage.

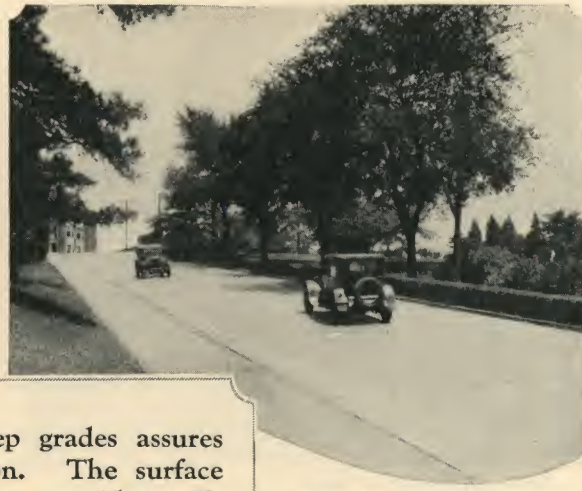
There are many heavy traffic concrete pavements in various parts of the United States which are giving splendid service. Among these are Indianapolis Ave., Chicago, Ill.; Harbor Truck Blvd., Los Angeles, Calif.; McGee Street, Kansas City, Mo.; Union Street, Seattle, Wash.; and Commonwealth Ave., Boston, Mass.

Concrete foundations are necessary for the success of any heavy traffic pavement. Why pay the extra cost for a "wearing surface" of another material, when the concrete surface itself represents the ultimate in paving satisfaction?

PAVEMENTS FOR MODERN TRAFFIC



Cliff Avenue, Tacoma, Wash.



Bond Street, Macon, Ga.

Concrete on steep grades assures safe transportation. The surface texture of concrete provides sufficient traction for ascending and enough resistance to prevent skidding when descending. Wet or dry, concrete pavements offer the safest tractive surface.



Avenue I, South, Birmingham, Ala.



Division Street, Atchison, Kan.



Warsaw Ave., Birmingham, Ala.



Broad Street, Asheville, N. C.



Easton, Pennsylvania—



Concrete pavements offer maximum safety for the traffic on these steep hills

—Hollywoodland, Calif.

STEEP GRADES



IN laying out a system of city streets, one of the major considerations is the topography of the area. For new cities, streets may be located with due regard to the topography and other conditions. In the older cities it is practically impossible to change the location of streets, however desirable it may be to do so. Consequently, we have many steep grades. Even in many of the recently planned towns and subdivisions it has been impossible to adhere always to strict rules regarding maximum permissible grades.

It is advisable to avoid steep grades as much as possible, but where they are necessary the greatest care should be exercised in the selection of the pavement material. A slippery pavement is a hazard even on a level street, but on a hill the danger is increased many times. The pavement should be smooth enough to provide good traction without becoming slippery even when wet. The practical surface to meet such conditions is the smooth but gritty texture of concrete.

Concrete has been laid on grades over five per cent in more than seventy cities of the United States. Many of these are

over 10 per cent and several are over 20 per cent. Part of Baxter Street in Los Angeles, with a grade of 29 per cent, is concrete paved. Hill Street in San Francisco, with a grade of 26.5 per cent is made safe with concrete. Altoona, Pa., and Seattle, Wash., are other examples of cities using concrete pavement for exceptionally steep grades.

This ability of tires to grip wet concrete has been officially recognized by the city of Los Angeles. This city adopted a resolution stipulating that nothing but concrete pavement be permitted for construction on streets having gradients exceeding six per cent. The decision is based on observations, experience and tests. Tests made in other cities have shown an interesting fact that when horses are given the rein on a grade where two types of pavement are in use they instinctively seek concrete to maintain a sure footing while ascending the hill.

While no special treatment of the surface is needed under ordinary conditions, if thought advisable it is a simple matter for the contractor to groove the surface of concrete during construction, or to broom the surface to form an especially gritty texture on the concrete.

BUSINESS AND INDUSTRIAL STREETS



VERCHANGING traffic conditions have demonstrated the advantages of concrete pavement for streets in the business and industrial districts. In the business sections where vehicles are continually starting and stopping, it is important to have pavements which even when wet provide a sure grip for rubber tires. With the ever-increasing volume of traffic into and out of business districts, the full width of the street is needed. A pavement which confines traffic to a single lane, because of the bumps, ruts and holes which have developed, is not giving a full measure of service. Pavements in business districts should be such that the full width of the street from curb to curb can be utilized.

Many business streets have a double line of car tracks which occupy about one-third of the street width. If the car track area is not provided with a smooth pavement, the capacity of the street is reduced to almost one-half. Business is directly

affected by the condition of the street pavement. Traffic will avoid the street which is badly rutted and full of holes and the merchants will do less business. Concrete from curb to curb, including the car track area, will provide a smooth pavement capable of giving service to the maximum number of vehicles and of facilitating the free and easy movement of traffic at all times.

The surface of a concrete pavement does not produce dust. It can be cleaned easily and helps to keep the business district in an attractive and inviting condition, always. It is the most rigid of pavements designed to meet the requirements of hard usage.

The illustration below shows the concrete paved Market Place of Chicago. Thousands of heavy vehicles use this area twenty hours out of each twenty-four to receive and distribute the food supplies of nearly three million people. It is a fine example of the use of concrete pavement for severe traffic.



Market Place, Chicago, Ill.

THE PAVEMENT FOR ANY CLIMATE



THE North American continent has probably the greatest variation in climate of any similar area in the world. From the tropical temperatures of the southmost tip of Florida, the Gulf Coast or southern California, one may travel inland, in the winter, to the extreme cold of high altitudes or northern latitudes. In the northern latitudes, inland, where one finds the greatest cold in winter, extreme heat in summer is also found. Summer temperatures between 100 and 110 degrees Fahrenheit, in the

shade, are frequently recorded in northern Minnesota, the Dakotas and Montana, while 30 to 40 degrees below zero is not uncommon during winter months. Such variation in temperature is a severe test for any pavement material.

Concrete pavements have withstood such climatic variations for many years and are as serviceable and attractive in appearance as the day they were built. Cities in arid Arizona and in the humid Mississippi Valley are served equally well.

Concrete is a universal material, adaptable to all climatic variations.

NORTH
Buffalo, N. Y.
Chicago, Ill.
Cleveland, Ohio
Detroit, Mich.
Duluth, Minn.
Erie, Pa.
Grand Rapids, Mich.
Milwaukee, Wis.
Minneapolis, Minn.
Rapid City, S. D.
St. Paul, Minn.
Toledo, Ohio
Winnipeg, Man., Can.

SOUTH
Atlanta, Ga.
Birmingham, Ala.
Dallas, Tex.
El Paso, Tex.
Ft. Worth, Tex.
Jacksonville, Fla.
Nashville, Tenn.
New Orleans, La.
Oklahoma City, Okla.
Memphis, Tenn.
San Antonio, Tex.
San Diego, Calif.
Tulsa, Okla.

EAST
Baltimore, Md.
Boston, Mass.
Cincinnati, Ohio
Indianapolis, Ind.
Lowell, Mass.
Newark, N. J.
New Haven, Conn.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Trenton, N. J.
Washington, D. C.
Wilmington, Del.

WEST
Denver, Colo.
Des Moines, Ia.
Kansas City, Mo.
Los Angeles, Calif.
Oakland, Calif.
Omaha, Nebr.
Portland, Ore.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
St. Louis, Mo.
Tacoma, Wash.



Obispo Avenue, Long Beach, Calif.



Sheridan Road, Kenilworth, Ill.



Longview, Wash.



Duluth, Minn.

NOR

WEST



Grand Junction, Colo.



Glenc



Los Angeles, Calif.



Galveston, Texas.

SOU

TH



Grand Haven, Mich.



Bangor, Me.



e, Ill.



Cape May, N. J.

E
A
S
T



Atlanta, Ga.



Lake City, Fla.

TH



Landis Avenue, Vineland, N. J. Often wet but never slippery—it's concrete.



Modern lighting and concrete pavement turn night into day in the business section of Logan, Utah.

SAFETY AND VISIBILITY



HOW quickly can an automobile stop? Assuming the car to be in good mechanical condition, with good brakes, the answer depends upon the pavement surface. Every experienced driver knows there is a great difference in his ability to stop quickly on different types of pavement, especially in bad weather. When you are driving along a slippery street, cautiously and with nerves tense, and then come to a stretch of concrete, isn't there a sense of relief and a feeling of positive security? Like emerging from darkness into daylight. You feel a complete control over the car and know instinctively that the distance in which you can safely stop your car has been greatly reduced.

In spite of all precautions, children persist in running unexpectedly into the street and often a quick twist of the wheel and jamming of brakes is necessary for the motorist to avoid an unfortunate

accident. A bad skid or failure to stop on a slippery pavement has frequently caused serious injury or cost a life.

During the winter, almost every issue of a daily paper carries a tragic story of automobile accidents due to slippery streets. Much of the pavement in the older cities was laid several years ago when automobiles were not largely used in the winter. Today motor cars are used in all seasons and all kinds of weather. The result is that some of the old types of pavement which lack an even, gritty surface, present a serious hazard to the motorist, and accidents due to skidding are common.

Driving over any type of unknown streets at night requires extreme caution, but the nerve tension is considerably relieved if the pavement is concrete. The better visibility of its even, gray surface, too, is conducive to safer travel.

Concrete is the safest pavement, night or day, wet or dry.

HEALTH, CLEANLINESS AND SANITATION



HEALTH officers have declared that the condition of streets and alleys has a direct bearing upon the health of a city's inhabitants. The need for cleanliness and sanitation increases with the density of population. In the confined areas of our cities and metropolitan suburbs, sanitary conveniences and clean streets are prime requisites for our standard of living.

For reasons of health, sanitation, appearance and comfort for you and your family, the street in front of the place where you live or do business should be paved with the best material money will buy. There should be no ridges or depressions to collect filth and the surface should be easy to clean by flushing.

Street dust is not only disagreeable—it is a menace to health. The common respiratory diseases which we refer to as

"colds" are frequently caused by dust-carried bacteria. Certainly, epidemics of these infections are common after periods of windy weather in dust-plagued areas. They can be prevented, or greatly minimized, by modern street cleaning equipment, provided the pavements are such as to permit its use. These facts alone often point to the economy of replacement of an old rough street surface with modern concrete pavement which is smooth and safe. The replacement may lower the cost of cleaning to such an extent as to be an important factor in reaching a decision on the value of the improvement.

A heavy rain will wash a concrete pavement clean. In dry, dusty weather, a power-driven flusher will clean the concrete surface of every vestige of street dirt. Neither rain nor artificial flushing makes concrete slippery. The pavement itself produces no dust.



A power flusher leaves the concrete pavement as clean as a dinner plate.



Concrete drives helped sell these California hills for beautiful homes.



The concrete pavement on Winan's Way, Baltimore, Md., adds much to the beauty of the homes built along this street.

CONCRETE PAVEMENT SELLS REAL ESTATE IN NEW SUBDIVISIONS



EVERYWHERE development follows the paved street. No one realizes this fact more than the realty subdivider. The existence of street improvements is a very important part of his sales argument and a convincing one to the purchaser.

Concrete has been selected for exclusive subdivisions in every part of the country.

North of Chicago, for example, along the lake shore, are many palatial homes and beautiful estates in the residential cities, villages and subdivisions of this well known district. In all of these suburbs concrete is the most popular pavement and in newer subdivisions it is used exclusively. Along the exclusive North Shore of Long Island, N. Y., private streets of concrete head the list of special features offered at Bayview Colony, one of the most unusual of the many real estate developments. Numer-

ous exclusive subdivisions in California, notably in the vicinity of Los Angeles, have enjoyed rapid development since concrete streets were laid. Similar examples may be found near Buffalo, N. Y., Cincinnati, Ohio, Birmingham, Ala., and in practically every locality where high grade subdivisions have been placed on the market. This discrimination by real estate men in favor of concrete pavements is based on their selling experience.

There is no better proof that concrete increases the value of property, in excess of the pavement cost, than the fact that experienced subdividers use it. If concrete pavements were not a good, sound investment would realtors be so eager to pave before placing their subdivisions on the market?

It is well-nigh impossible to sell high class lots unless the streets are paved. Discriminating purchasers of good real estate demand concrete paved streets.

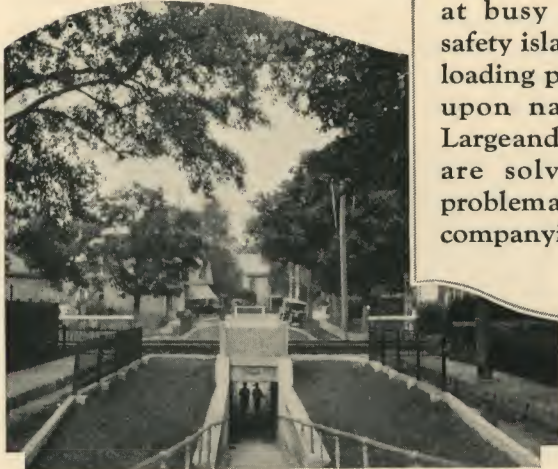
PAVEMENTS FOR MODERN TRAFFIC



Pedestrian tunnel for school children in Los Angeles.



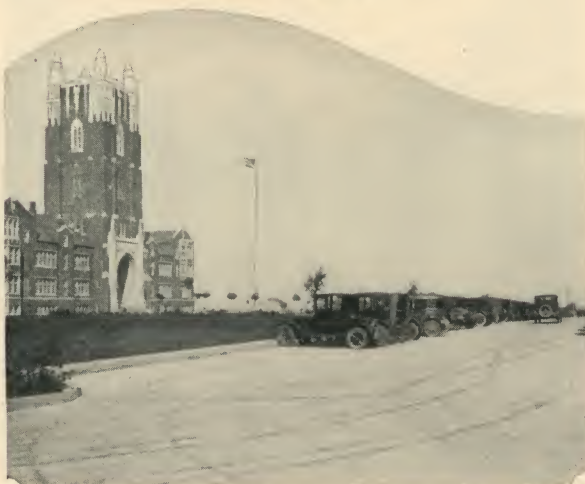
Grand Boulevard underpass at Jefferson Street, Detroit.



Pedestrian subway under railway tracks at Elkins Park, Pa.



Parking does not interfere with traffic on Washington Avenue, Titusville, Fla.



North Blackwelder Street, facing Oklahoma City University, has been widened to provide for parking of automobiles.



Safety island for street car users at Tenth Avenue and 40th Street, Seattle, Wash.

MODERATE FIRST COST AND LOW MAINTENANCE COST



WHEN considering maintenance expenses, it is well to remember that, whether the streets are paved or not, some money must be spent for upkeep. Low maintenance cost and a reasonable first cost make a truly economical pavement for the tax-payers.

Low first cost alone is no virtue; the lowest priced pavement may prove the most expensive in the end. The first cost of concrete is not high, compared with other materials, nor yet the lowest, but it is the most economical in the long run. Its maintenance cost is exceptionally low. The only maintenance necessary on a well constructed concrete street is periodical attention to joints. There are innumerable instances where concrete streets have received no attention for several years, yet are in fine condition.

In cities which keep reliable maintenance records concrete has proved to be

the least expensive of all types. An example may be found in Beloit, Wis. The concrete pavement under maintenance totaled 24,400 square yards in 1919, and in 1925 this had increased to 192,300 square yards. The cost of maintenance for the entire seven years, 1919 to 1925 inclusive, was \$258.08. This was considerably less than for any other type during the same period.

Maintenance work on a concrete street does not interfere with the normal movement of traffic. Usually, this work consists of filling joints with bituminous material and making patches and replacements where needed. These operations are easily and rapidly accomplished and can be completed with a minimum of cost and traffic interference.

Special tools and equipment are not needed for the maintenance and repair of concrete pavements, therefore maintenance costs are reduced to a minimum.



The oldest concrete pavement in America—Columbus Street in Bellefontaine, Ohio, built in 1893, is still in service.



East Grand Avenue, Beloit, Wis., concrete paved in 1925, is a modern example of permanent pavement.

PAVEMENTS FOR MODERN TRAFFIC



Methuen, Mass.



Macon, Ga.

Streets paved with concrete from curb to curb, including car track areas, give maximum service. When the car track area is smoothly paved it can also be used to facilitate the free movement of motor traffic. Concrete car-track pavements are permanent and reduce the necessity for track rehabilitation to a minimum.



Seattle, Wash.



Cincinnati, Ohio.



Champaign, Ill.



Chattanooga, Tenn.



Concrete resurface laid on an old concrete base in 1923. Lee Street, Greenville, Texas.



Hewitt Avenue, the principal thoroughfare of Everett, Wash., was resurfaced with concrete in 1923.

RESURFACING



WHEN the surface of an old pavement has outlived its usefulness, maintenance and repair charges become excessive. There are many pavements, however, that have a concrete foundation in good condition. If the grades do not have to be changed, it would be uneconomical to remove such a base. A far better solution would be to remove the worn out surface only and replace it with a concrete "second story."

There are many cases where concrete has been successfully used for resurfacing worn out pavements. It provides a riding surface which is as durable as the foundation upon which it is laid, and affords the same desirable characteristics as an all-new concrete pavement, at the same time conserving the investment in the original foundation.

Many communities have solved the problem of the worn out street by resurfacing with concrete. Union Street, a busy downtown street of Seattle, was resurfaced with concrete in 1923 and is

giving perfect service. Twenty-second Street, the main business thoroughfare of Cicero, Illinois, was resurfaced with concrete in 1926, and the great satisfaction that has resulted from this pavement is responsible for a more extensive concrete resurfacing program which will be carried out in the near future. A few of the other cities which have likewise gained satisfaction by resurfacing with concrete are: Oswego, N. Y., Pine Bluff, Ark., Marshalltown, Iowa, Greenville, Texas, Kirksville and Savannah, Mo., and Everett, Wash. Many of the old concrete pavements on California highways were built as a foundation for future surfacing with other material. However, when funds became available, the California Highway Department resurfaced these foundations with concrete and widened them at the same time.

The thickness of concrete resurfacing varies from four to six inches. The thickness will be governed by grade and drainage requirements, and by the condition of the old foundation.

PAVEMENTS FOR MODERN TRAFFIC



Riverview Park, Pittsburgh, Pa.

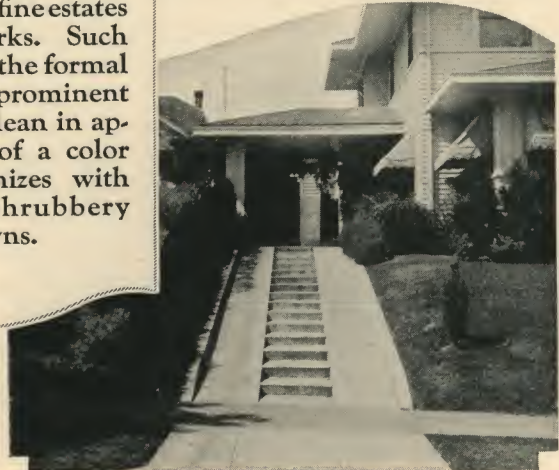


Governor's mansion, Olympia, Wash.

Park drives and private driveways, built of concrete, enhance the natural beauty of many fine estates and public parks. Such drives preserve the formal aspect of many prominent estates, being clean in appearance and of a color which harmonizes with surrounding shrubbery and lawns.



Park drive of concrete in Brightwater, N. Y.



Combination drive and steps, Portland, Oreg.



At the Roycroft Shops, East Aurora, N. Y.



Attractive, curved driveway in Seattle, Wash.

CONSTRUCTION



CONCRETE pavement is easily built. Construction operations are simple and the equipment is standard. Materials can be obtained on the home market, usually from

local dealers, and workmen may be hired in the vicinity of the work. Concrete construction improves local business.

Traffic need not be inconvenienced while laying a concrete pavement. A common method of construction is to build one-half of the pavement at a time and to maintain traffic on the other half. Concrete is speedily placed and finished.

Recent developments in technique have made it possible to open a concrete pavement to traffic three or four days after it is placed. Proven methods of selecting, proportioning and mixing the materials are responsible for this advance.

Strength requirements are rapidly coming into general use as a means of determining the time at which the pavement may be opened to traffic. Test specimens are moulded from the concrete as it is placed and receive the same curing as the

slab. These specimens are tested at regular intervals and show definitely the average strength of concrete in the pavement. Traffic is permitted as soon as the tests show the engineer that the requisite strength has been attained.

Increased use and adaptability of concrete for pavements is the result of many years of painstaking laboratory research, and the practical experience of more than three thousand towns and cities.

A concrete pavement can be designed for any width, grade or crown. A wide pavement can be built as easily as one of less width. In making permanent street improvements it is advisable that a competent engineer be employed to design these pavements. Concrete pavements are easily built in accordance with the specifications prepared. In order to insure the quality of the finished product, however, complete inspection during construction is an important consideration.

Money expended for really competent engineering and inspection service will yield returns far more important than the amount involved.

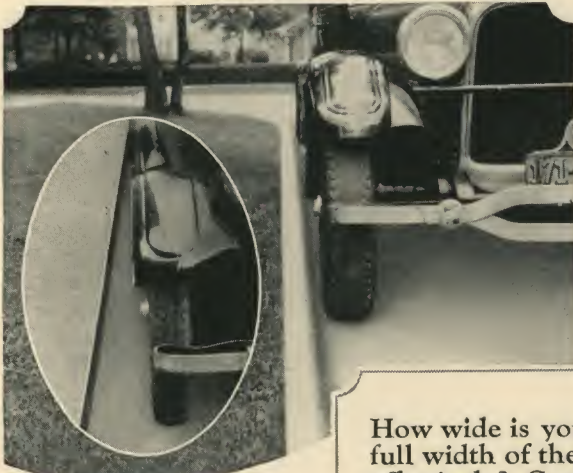


Laying an intersection at Waukegan, Ill.



Main Street, Lexington, Ky., being paved one-half at a time.

PAVEMENTS FOR MODERN TRAFFIC



Rubber-tired vehicles can park close to sloping-faced curb with safety. (Inset) Vehicles must park away from straight-faced curb to avoid tire injury.



Concrete curb walk on Winthrop Ave., Chicago, protects parkway lawns.

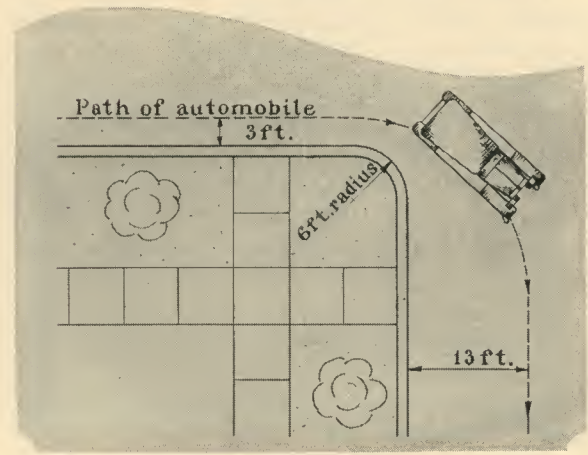
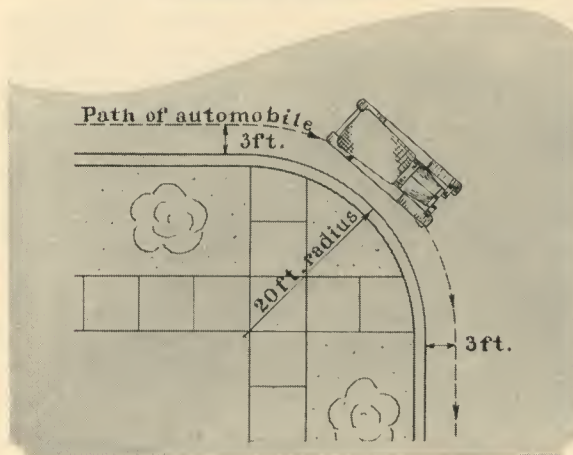
How wide is your street? Can the full width of the pavement be used effectively? Curb design has an important bearing on the answers to these questions. The pictures on this page, and the diagrams at the bottom, show some good, well-tried designs—and how to remedy some common mistakes.



Low, sloping-faced curb as used in Park Ridge, Ill., is convenient for pedestrians.



Wide radius curbs at intersections facilitate the ease with which vehicles can turn corners.





The walls of the hole around this new valve box are being trimmed to receive the concrete.



After valve box is installed and the walls properly prepared, the pavement can be replaced with little difficulty.

REPAIRS AND REPLACEMENTS



UBLIC utility companies frequently find it necessary to make cuts into concrete pavements in order to repair or replace underground conduits. When this is done, the openings must be replaced.

These replacements can be made more quickly and economically with concrete than with any other material. Only one material — CONCRETE — is required. Few men, few tools and a small amount of material complete the necessities. The job is completed the same day it is begun. Concrete replacements do not necessitate the establishment and upkeep of expensive maintenance plants.

Replacements are made with quick hardening concrete. This is made with standard portland cement mixed in a richer proportion for a slightly longer period of time than ordinary concrete, and contains only a minimum amount of

water. After the concrete has been deposited and leveled off, it should be tamped repeatedly and finished with a hand float. The tamping takes up the small amount of shrinkage that occurs during hardening. Particular care should be taken to smooth the edges, as this aids in securing an invisible replacement. Replacements of this type can be opened to traffic in twenty-four hours.

If properly made, concrete replacements are permanent. They give the same satisfactory service as the surrounding pavement surface; and will not settle nor cause unevenness because of the perfect bond that is established between the new and the old concrete.

Replacements in concrete pavements are being successfully made in cities of all sizes in various parts of the United States. Macon, Ga., is a leader in this class of work, and the methods developed there are being used in many other cities.

PAVEMENTS FOR MODERN TRAFFIC

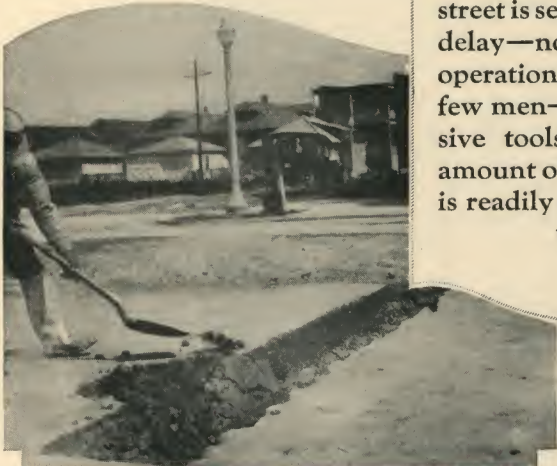


Cutting concrete slab with pneumatic tools.

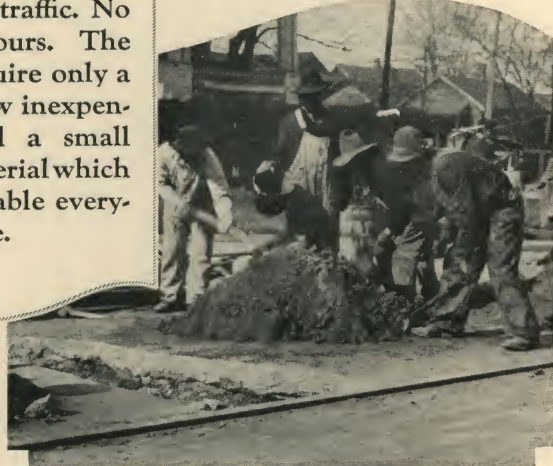


Tamping is important while placing.

Concrete patches or replacements are easily and quickly made while the street is serving traffic. No delay—no detours. The operations require only a few men—a few inexpensive tools and a small amount of material which is readily available everywhere.



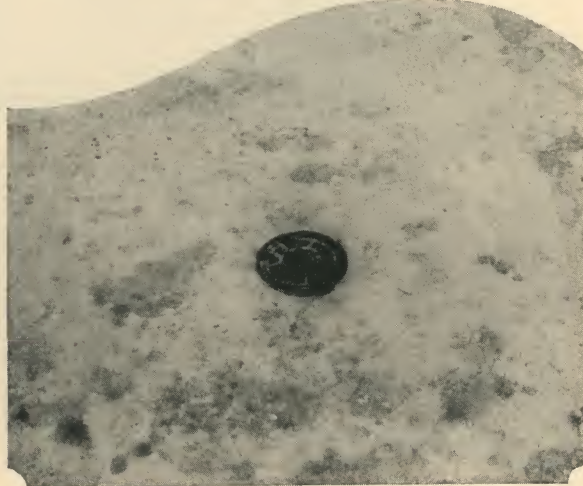
Depositing concrete in cut. Note dryness of concrete and vertical edges.



Concrete for patching should contain little water.



Finishing concrete patch. Care is exercised to float the edges of the patch well.



Careful finishing results in a patch which is practically invisible.



General Offices and Laboratory Building

Portland Cement Association

Thirty-Three West Grand Avenue

Chicago

A National Organization

to Improve and Extend the Uses of Concrete

THIS phrase states in formal language the purpose of the Portland Cement Association. It is a service organization, supported by the manufacturers of portland cement, for the benefit of users and prospective users of concrete.

The Association was organized in 1902 by a small group of manufacturers. Since 1915, its service has been available on a truly national scale.

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*Concrete is a basic material in nearly
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